2823

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Joseph E. Geusic et al.

Title: METHOD OF FORMING AN OPTICAL FIBER INTERCONNECT THROUGH A SEMICONDUCTOR WAFER

Docket No.: 303.390US3
Filed: August 30, 2000
Examiner: Julio Maldonado

Serial No.: 09/650,569
Due Date: January 24, 2003
Group Art Unit: 2823

Commissioner for Patents
Washington, D.C. 20231

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#17/Response

S/N 09/650,569 PATENT

2/4/03

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Serial No.:	09/650,569	Group Art Unit: 2823	
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Title:	METHOD OF FORMING AN OPTICAL FIBER INTERCONNECT THROUGH A SEMICONDUCTOR WAFER		

AMENDMENT AND RESPONSE UNDER 37 CFR § 1.111

Commissioner for Patents
Washington, D.C. 20231

Applicant has reviewed the Office Action mailed on October 24, 2002. Please consider the following remarks.

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on October 24, 2002, and the references cited therewith.

No claims are amended, canceled, or added; as a result, claims 39-72 are now pending in this application.

Information Disclosure Statement

Applicant respectfully requests that a copy of the 1449 Form, listing all references that were submitted with the Supplemental Information Disclosure Statement filed on November 13, 2001, marked as being considered and initialed by the Examiner, be returned with the next official communication.

§103 Rejection of the Claims

The Examiner has the burden under 35 U.S.C. § 103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). To do that the Examiner must show that some objective teaching in the prior art or some knowledge generally available to one of ordinary skill in the art would lead an individual to combine the relevant teaching of the references. *Id.*

The *Fine* court stated that:

> Obviousness is tested by "what the combined teaching of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 878 (CCPA 1981)). But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." *ACS Hosp. Sys.*, 732 F.2d at 1577, 221 USPQ at 933. And "teachings of references can be combined *only* if there is some suggestion or incentive to do so." *Id.* (emphasis in original).

The M.P.E.P. adopts this line of reasoning, stating that

> In order for the Examiner to establish a *prima facie* case of obviousness, three base criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *M.P.E.P.* § 2142 (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

An invention can be obvious even though the suggestion to combine prior art teachings is not found in a specific reference. *In re Oetiker*, 24 USPQ2d 1443 (Fed. Cir. 1992). At the same time, however, although it is not necessary that the cited references or prior art specifically suggest making the combination, there must be some teaching somewhere which provides the suggestion or motivation to combine prior art teachings and applies that combination to solve the same or similar problem which the claimed invention addresses. One of ordinary skill in the art will be presumed to know of any such teaching. (See, e.g., *In re Nilssen*, 851 F.2d 1401, 1403, 7 USPQ2d 1500, 1502 (Fed. Cir. 1988) and *In re Wood*, 599 F.2d 1032, 1037, 202 USPQ 171, 174 (CCPA 1979)).

Applicant respectfully submits that the Office Action did not make out a *prima facie* case of obviousness because the cited references fail to teach or suggest all of the elements of applicant's claimed invention.

Claims 39, 41, 43-46, 48, 50, 52, and 53

Claims 39, 41, 43-46, 48, 50, 52, and 53 were rejected under 35 USC § 103(a) as being

unpatentable over Gaul (U.S. Patent No. 5,618,752) in view of Haas et al. (U.S. Patent No. 5,848,214).

Gaul teaches the formation of an *electrical* via (215) for providing *electrical* contact between a circuit area (214) on one side of a wafer and an metal contact (222) on the other side of the wafer. See, e.g., column 7, line 31 to column 8, line 34, and FIGS. 2A-2D. Note, element (222) is *not* a functional circuit, as stated in section (5), page 2 of the Office Action. Rather, element (222) is a metal contact present to conduct an *electrical* signal passing through the *electrical* via (215). Thus, Gaul does not teach the first and second functional circuits as claimed in claim 39 and 48.

In Gaul, the only discussion of providing optical communication through a plurality of wafers is provided in FIG. 5 and the accompanying text in column 11, lines 35-60. In FIG. 5, an optical via (344) is formed in a first wafer (342) that allows for a transmitter (346) on a second spaced-apart wafer (341) to communicate to a detector (345) located on a third spaced-apart wafer (343). Thus, the optical via of Gaul is formed on a wafer that is separate from the wafers having functional circuits. In contrast, claims 39 and 48 recite that the optical fiber is formed in the hole, in which the hole is formed through the same wafer having the functional circuits.

Haas et al. teach fiber optic plates in a plurality of chip modules (114). See, e.g., FIG. 2A, FIG. 3A, and column 4, lines 1-7. Each chip module has one fiber optic plate (7) for holding optical fibers. The fiber optic plate is made of many optical fibers bundled together. The fiber optic plate is separate from other functional circuit layers of the chip module. Thus, Haas et al do not teach or suggest forming optical fiber in a wafer having functional circuits.

The combination of Gaul and Haas et al. fails to teach or suggest all the features of the invention as claimed in claims 39 and 48. Further, there is no motivation to combine the teachings of Gaul and Haas et al. Gaul is directed ostensibly to electrical vias, and the one optical via embodiment disclosed therein involves communicating between three separated wafers. Haas et al. teach a fiber optic plate consisting of optical fibers bundled together in a fiber optic plate, which is separate from functional circuits located in wafers separated from the fiber optic plate. Haas et al. do not teach forming optical fibers in holes in substrates.

Accordingly, applicant respectfully submits that a *prima facie* case for obviousness has

not been established with respect to claims 39 and 48. Therefore, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 39 and 48 and that these claims and the dependant claims 41, 43-46, 50, 52, and 53 be allowed.

Claims 55, 57, 59, 60, 62, 64, 65, 67, 68, 70, and 71

Claims 55, 57, 59, 60, 62, 64, 65, 67, 68, 70, and 71 were rejected under 35 USC § 103(a) as being unpatentable over Haas et al. in view of Gaul.

Haas et al. teach fiber optic plates in a plurality of chip modules (114). See, e.g., FIG. 2A, FIG. 3A, and column 4, lines 1-7 of Haas et al. Each chip module has one fiber optic plate (7) for holding optical fibers. The fiber optic plate is made of many optical fibers bundled together. The fiber optic plate of Haas et al. is separate from other functional circuit layers of the chip module. Thus, Haas et al. do not teach or suggest the limitation in Applicant's claimed invention of interconnecting first and second functional circuits on the substrate via an optical fiber formed through the substrate.

Gaul only mentions optical communication in FIG. 5 the accompanying text in column 11, lines 35-60. In FIG. 5, an optical via (344) is formed in a first wafer (342) that allows for a transmitter (346) on a second spaced-apart wafer (341) to communicate to a detector (345) located on a third spaced-apart wafer (343). Thus, the optical via of Gaul is formed on a wafer that is separate from the wafers having functional circuits. In contrast, claims 55, 62, and 68 recite that the optical fiber is formed in the hole, in which the hole is formed through the same wafer having the functional circuits.

The combination of Haas et al. and Gaul fails to teach or suggest all the features of the invention as claimed in claims 55, 62, and 68. Further, there is no motivation to combine the teachings of Haas et al. and Gaul. Haas et al. teach a fiber optic plate consisting of optical fibers bundled together in a fiber optic plate, which is separate from functional circuits located in wafers separated from the fiber optic plate. The teaching of Haas et al. has nothing to do with forming optical fibers in holes in substrates. Gaul is directed ostensibly to electrical vias, and the one optical via embodiment disclosed therein involves communicating between three separated wafers. Gaul does not teach forming optical fibers in holes in substrates having functional

circuits.

Accordingly, applicant respectfully submits that a *prima facie* case for obviousness has not been established with respect to claims 55, 62, and 68. Therefore, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 55, 62, and 68 and that these claims and the dependant claims 57, 59, 60, 64, 65, 67, 70, and 71 be allowed.

Allowable Subject Matter

Claims 40, 42, ,47, 49, 51, 54, 56, 58, 61, 63, 66, 69, and 72 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant believes that all of the claims, as written, are allowable for the reasons presented above.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's representative at (612) 373-6969 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

JOSEPH E. GEUSIC ET AL.

By their Representatives,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, Washington, D.C. 20231, on this 23rd day of January, 2002.

Name Amy Moriarty Signature _____